

SEQUENCE LISTING



<110> Fallon, Robert D.
Payne, Mark S.
Picataggio, Stephen K.
Wu, Shijun

<120> Transformed Yeast Strains and Their Use for the Production of Monoterminal and Diterminal Aliphatic Carboxylates

<130> CL-1035

<140> 09/116,502
<141> 1998-07-16

<150> 60/053,215
<151> 1997-07-21

<160> 43

<170> Microsoft Office 97

<210> 1
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for the cytochrome P450-NADPH reductase

<400> 1
aggatccatg gcattagata aattag 26

<210> 2
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the cytochrome P450-NADPH reductase

<400> 2
accttaggcta ccaaacatct tcttg 25

<210> 3
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for the cytochrome P450Alk1-A gene

<400> 3
cggttaccatg gctatagaac aaatta

<210> 4
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the cytochrome P450Alk1-A gene

<400> 4
agggcccttt agcagaaata aacac

<210> 5
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for the cytochrome P450Alk3-A gene

<400> 5
actcgagatg ccggtttcct ttgttc

<210> 6
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the cytochrome P450Alk3-A gene

<400> 6
agggccccgtta catttggata ttgg

<210> 7
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for the PGK promoter

26

25

26

24

<400> 7
aactagtgg agagcgatgg ttacatacga c 31

<210> 8
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the fusion of the PGK promoter to the P450Alk1-A gene

<400> 8
ttgttctata gccattctag ttaaggcaat tgat 34

<210> 9
<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for the 5' end of the P450Alk1-A gene

<400> 9
gccttaacta gaatggctat agaacaatt attgaagaa 39

<210> 10
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the 5' end of the P450Alk1-A gene

<400> 10
taaacctgca gtggtatctc taccggca 28

<210> 11
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for the 3' end of the P450Alk1-A gene

<400> 11
tgcccgtaga gataccactg caggttta 28

<210> 12
<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the 3' end of the P450Alk1-A gene

<400> 12
cataaaaaat caattctatt tagcagaaat aaaaacacc 39

<210> 13
<211> 37
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for the fusion of the PGK terminator to the P450Alk1-A gene

<400> 13
atttctgcta aatagaattt atttttatg acacttg 37

<210> 14
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the PGK terminator

<400> 14
aaagcttagct ttgaaacaat ctgtggttg 29

<210> 15
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the fusion of the PGK promoter to the P450Alk3-A gene

<400> 15
aaaggaaacc gacattctag ttaaggcaat tgat 34

<210> 16
<211> 39

<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for the 5' end of the P450Alk3-A gene

<400> 16
gccttaacta gaatgtcggt ttcctttgtt cacaacggtt 39

<210> 17
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the 5' end of the P450Alk3-A gene

<400> 17
tcttgatat cgaaagtttt accttgac 28

<210> 18
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for the 3' end of the P450Alk3-A gene

<400> 18
gtcaaggtaa aactttcgat atccaaga 28

<210> 19
<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the 3' end of the P450Alk3-A gene

<400> 19
cataaaaaat caattttagt acatggat attggcacc 39

<210> 20
<211> 37
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for the fusion of the PGK terminator to the P450Alk3-A gene

<400> 20
atccaaatgt actaaaattg atttttatg acacttg 37

<210> 21
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the fusion of the PGK promoter to the cytochromeP450-NADPH reductase gene

<400> 21
tttatctaat gccattctag ttaaggcaat tgat 34

<210> 22
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for the 5' end of the cytochrome P450-NADPH reductase gene

<400> 22
gccttaacta gaatggcatt agataaatta gattt 35

<210> 23
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the 5' end of the cytochrome P450-NADPH reductase gene

<400> 23
aagtggaaatc taaagctttt aattcg 26

<210> 24
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for the 3' end of the cytochrome P450-NADPH
reductase gene

<400> 24
cgaattaaaa gcttttagatt ccactt 26

<210> 25
<211> 36
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer for the 3' end of the cytochrome
P450-NADPH reductase gene

<400> 25
cataaaaaat caattctacc aaacatcttc ttggta 36

<210> 26
<211> 37
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer for fusion of the PGK terminator to the
cytochrome P450-NADPH reductase gene

<400> 26
gaagatgtt ggtagaattt atttttatg acacttg 37

<210> 27
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer to the Candida maltosa POX4 gene

<400> 27
gggtcacgga tccaatgttg ctgg 24

<210> 28
<211> 36
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer to the Candida maltosa POX4 gene

<400> 28
gcagcagtgt atggatcctt agtgttcttt ggtggg 36

<210> 29
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer to the Candida maltosa URA3 gene

<400> 29
gactttgatc aattttggta ccat 24

<210> 30
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> antisense primer to the Candida maltosa URA3 gene

<400> 30
agggtaccat gaagtttag actcttgatc act 33

<210> 31
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<223> sense primer to the Candida maltosa ADE1 gene

<400> 31
cttcttcaaa ccttcataatg acattgttac g 31

<210> 32
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
 <223> antisense primer to the Candida maltosa ADE1 gene

 <400> 32
 ctaatggtca agcatatgtt gcattatc 28

 <210> 33
 <211> 31
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: primer

 <220>
 <223> sense primer to the Candida maltosa HIS5 gene

 <400> 33
 tttggttgac tcataatgtga gcgcgtaaa g 31

 <210> 34
 <211> 31
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: primer

 <220>
 <223> antisense primer to the Candida maltosa HIS5 gene

 <400> 34
 gttttgtctg gccatatgtt gaactggatg g 31

 <210> 35
 <211> 1572
 <212> DNA
 <213> Candida maltosa

 <220>
 <223> cytochrome P450 monooxygenase Alk1-A

 <400> 35
 atggctatag aacaaattat tgaagaagta cttccttact taactaaatg gtacaccatt 60
 ttatTTggtg cagctgtcac ttactttta tctatcgott taagaataa attttacgaa 120
 tataaatgta aatgtgaaaa tccagtatac tttgaagatg ctgggttgg tggattcca 180
 gctttaatcg atatcattaa agttagaaaa gcagggtcaat tagccgacta tactgatact 240
 acttttgata aatatccaaa cctctccct tacatgactg ttgctgggtgt tttgaaaatt 300
 gtttttactg ttgatccaga aaacatcaaa gctgtcttag ctacccaaatt taatgatttc 360
 gctttaggtg ccagacatgc tcactttgat ccattgttg gtgatggtat tttcactttg 420
 gatggtaag gttggaaact tagtagagct atggtgagac cacaatttgc cagagaacaa 480
 attgctcatg ttaaagctt agaaccacat gttcaaattt tggctaaaca aattaaatta 540
 aacaagggtta aaactttga cttacaagaa ttattcttca gattaccgt tgataccgct 600
 actgaatttt tgggggtga atccgtccac agtttgtacg atgaaaaatt gggcatccct 660
 gctccaaacg atatcccagg tagagaaaat ttgcgtgaag ctttcaacac ttcccaacat 720
 tatttagcta ccagaactta cagtcaaattc ttttactggt taactaacc taaagaattc 780
 agagattgtt atgctaaagt ccataaattt gctcaatatt tcgttaacac tgctttgaat 840
 gccactgaaa aagaagttga agaaaaatct aaagggtgggtt acgtttctt gtatgaattg 900
 gttaaacaaa ctagagatcc aaaagtttg caagatcaat tattaaacat tatgggtgcc 960
 ggttagagata ccactgcagg tttatgtct ttgctatgt ttgaatttgc cagaaaccca 1020

aagatttgg acaaattgag agaagaagtt gaagtttaatt tcggatttgg tgacgaagcc 1080
 agagtcgacg aaatttcttt tgaaactttg aagaaatgtg aatacttgc agctgtctt 1140
 aatgaaaacct taagaatgtc tccttccgtc ccaattaatt tcagaactgc taccagagac 1200
 acaacattac caagaggtgg tggtaaagat gttaactctc ctatcttgc tccaaaagg 1260
 tcttctgtt tttactctgt ttacaaaact cacagattga agcaattcta tggtaaagac 1320
 gcttatgaat tcagaccaga aagatggttt gaacccaagta cttagaaaatt gggttgggct 1380
 tatctccat tcaatggtgg tccaagaatt tgtttgggct agcaatttgc tttgactgaa 1440
 gcttcatatg ttattgccag attggccaa atgtttgaac atttggaaatc taaagatgaa 1500
 acttaccac caaacaaatg tattcatctt accatgaacc ataacgaagg ggtgtttatt 1560
 tctgcttaat ag 1572

<210> 36
 <211> 1581
 <212> DNA
 <213> Candida maltosa

<220>
 <223> cytochrome P450 monooxygenase Alk2-A

<400> 36
 atgacttccg attcaactat tcacgaatta attcaatcat acattacca aatggtatgtc 60
 attgtaccac tcgctatcat catctataaa gtattcgatt acttctatgt cttaagttta 120
 aggaaaagac ttggagctgc agttccaact aatgaagaaa ccgatggta ttgcggggtc 180
 catttacattt ttgttttaat gtcaaaaaag aagatggta ccattcattga ttttccatt 240
 gaacgttacc cagaacttaa acacccagaa accccaacat ttgaattccc aattttact 300
 gtcaaatgaa ttctactat tgatccagaa aatatcaaag ctattttagc tacccagtt 360
 agtgatttct ccttgggaaac tagacatgca cattttgctc ctttaattgg agatggatt 420
 ttcaacttgg atggtgctgg ctggaaacat agtagagccca tggtagagacc acaatttgc 480
 agagaacaag ttggcatgt taaatttata gaaccacacg ttcaagtctt gtttaaacat 540
 atcagaaaaga ataaaggtag agaatttgat cttcaagaat tattttcag atttactgtt 600
 gattctgcca ctgaattttt gtttggtaa tccgttgaat ctttacgtg tgcttctatt 660
 ggtatgactt caaaatctaa agacgttgac gtttggtaa atttcaactgg cgcttttaac 720
 tattctcaaa actacttggc ttctcgaagc atcatgcaac aattttactg gatcttgaat 780
 ggtttttttt tcaagagaatg taatgttatt gtccataataa ttgtcgatccatgtccaa 840
 aaaggccttga atttgactga agctgatgg gaaaaacaag cgggttatgt gtttttgat 900
 gaattggta aacaaacttag agatccacaa gtgttggagag atcaatttgat gaatattttg 960
 gttgtggaa gagatacaac tgctgtttt tggtcgatccatgtccaaatgtccaa 1020
 aatcctgtat ttgttgcata gttgaagat gaaattgtataa ccaagtttgg attaggtgaa 1080
 gatgtcgta ttgaagaaat tacttgcata tctttgaaac aatgtgaata cttgaaggct 1140
 gtgtcaatg aatgttttaag attgtatctt tctgttccac aaaatttgc agttgtact 1200
 aagaataacta cattaccaag aggtgttggt aaagatggat tgcgtccaaatgtccaa 1260
 aagggacaaa ctgttatgtt cagttttat gctactcaca gaatggaaatc tggttacgg 1320
 aaagatgcaaa ccactttcaag accagaaaaga tgggttggaaac cagaaaccag aaaattgggt 1380
 tgggttttgc ttccattcaaa tgggttggccaa agaatctgtt taggtcaaca atttgctta 1440
 actgaagctt cctacgttac agtttagatta ctccaaagaat ttgtactt gactctggac 1500
 ccaaatcttgc aatatccacc aaagaaaatg tcccatgttgc ccatgtcgatccatgtccaa 1560
 acaaacgttca aatgttataa g 1581

<210> 37
 <211> 1617
 <212> DNA
 <213> Candida maltosa

<220>
 <223> cytochrome P450 monooxygenase Alk3-A

<400> 37
 atgccgggtt cctttgttca caacgtttta gaagttgtaa ctccttatgt cgagtactat 60
 caagaaaatc ttactaaatg gtatatttttgc ataccaacta ttcttcttac tttgaatttt 120
 ttgagtattc ttcacacacaa gtatttggaa tataagtta atgccaacc acttaccaat 180

tttgcccaag	attattctt	cgggttata	actccattga	tgttgatgt	cttcaaattgg	240
catggtaacc	ttatgaaatt	tgctttaac	gtttggaata	ataaaatttc	tgtcctgaac	300
ggaaatgttc	gtactgttgg	tctcagaatt	atgggggttga	atattattga	aactactgat	360
ccagaaaatg	ttaaagctat	tttggctact	caatttaatg	atttctcggt	aggtactaga	420
catgatttct	tatattcatt	gttaggtgac	gttattttca	cttagatgg	tgctgggtgg	480
aaacacagca	gagctatgtt	gagaccacaa	ttcgctagag	aacaaggttgc	tcacgttaaa	540
ttgttggAAC	ctcacgttca	agtcttggtt	aaacatgtt	gaaaaaggta	aggtaaaact	600
ttcgatatacc	aagaattatt	tttcagattt	actgttact	cttctactga	atttttgttt	660
ggtggttctg	ttgaatctt	acgtgatgt	tctattggta	tgactccaag	tactaaaaat	720
attgctggt	gagaagaatt	tgctgacgt	ttcaactatt	ctcaaaccta	caatgcttac	780
agattcttgt	tgcaacaatt	ttactggatc	ttaaatgggtt	ctaaattcaa	taaatccatc	840
aagactgttc	ataaaatttc	tgatttctat	gttcaaaaag	ctttgagttt	aaccgaagct	900
gatttggAAA	aacaagaagg	ttacgtttt	ttgtacgaat	tagccaagca	aaccagagat	960
ccaaaagtgt	tgagagatca	attgttaaac	atcttgggtt	ctggtagaga	taccactgt	1020
ggtttattat	ctttcccttt	cttgagttt	tccagaaacc	caactgttt	cgaaaaattt	1080
aaggaagaaa	ttcacaatag	atttgggtct	aaagaagacg	ctcggttga	agaaaattact	1140
tttgaatctt	tgaaaactgt	tgaatacttg	aaagcttgg	tgaatgaagc	attgagagta	1200
tacccatcg	tgccacacaa	tttcagagtt	gcaaccagaa	atacaacatt	accaagaggt	1260
ggtggttaaag	acggtatgtc	tccaaattgt	atcaagaag	gtcaaaatgt	gatgtacact	1320
attttggcta	ctcatagaga	tccaaatatt	tatggtgaag	atgctaattgt	tttttagacca	1380
gaaagatgtt	ttgaaccaga	aactagaaag	tttaggtggg	cttatgttcc	attcaatgg	1440
ggtccaagaa	tttggtagg	tcaacaattt	gctttgactg	aagcttctt	tgtcactgtt	1500
agattgttc	aagaattcca	tacattaact	caagatgcgg	ataccagata	cccaccaaga	1560
ttacaaaaca	gtttgacatt	atcactttgt	gatggtgcca	atatccaaat	gtactaa	1617

<210> 38
<211> 1518
<212> DNA
<213> *Candida maltosa*

<220>
<223> cytochrome P450 monooxygenase Alk4-A

<400> 38						
atggcttatt	ttactccaga	actatggtt	atatgtttt	cagtgaccgt	ttatatatcttc	60
gattatatact	acaccaaata	cttgatgtac	aaattgggtt	caaaaacaaat	tacacacgtc	120
atcgatgtat	ggtttttgcg	gttcagatta	ccttttttaa	tcacactggc	aaataatcaa	180
ggtcggttaa	ttgaatttgc	tgttaaacgg	ttcttattcta	gtccatcatca	aactttcatg	240
aatagagcgt	tcggatccc	cattattcta	acccgagatc	ccgtcaacat	caaagcgatg	300
ttagctgtcc	agtttgacga	atttcccctt	gttttggat	acaaccaatt	cgaaccactc	360
ttggggaaacg	gcattttcac	ctccgatgg	gaaccatgg	aacatagtag	aataatgtt	420
cgccccccagt	ttattaaatc	ccaagatattc	cacgtcaatc	gttttggacc	acattttcat	480
ttactccaaa	aaaatatac	cggccaaaca	gacaattt	ttgatatacc	aaccttggtt	540
ttccgattca	cttagatac	ggcaacggaa	ttcttatttt	gacaatctgt	ccacttattt	600
aacgatggag	aaaattctt	acaattccgt	gaagcttca	ccaaatcaca	agcaatattt	660
gctactcgag	caaacttgc	tgaattat	tttttagcag	atggaaatca	gttttagacag	720
tataataaaa	tggttcaaga	tttttagtca	cggtgtgt	ataaaatgtt	gaacatgtcc	780
aatagtggaaa	tcgacaaaact	ggcagat	ttttttttt	atgaaatgg	taaaattact	840
cgaaatccac	agtttttac	tgtcaatgt	ttgaatatac	tacttgcgg	aagagacacc	900
acagcgtcat	tgttatacg	cgctttttt	gaacttagccc	taatgaacc	aatttggatt	960
aaattacgt	ctgaaggtt	ccacgttcc	caaacttccc	ttgaaattgt	tacattcgat	1020
ttattgtggaaa	ctaaatgtcc	atatacaca	gccatcctac	atgaaacatt	acgactctat	1080
ccaagcgtcc	ctcgaaatgc	ccgggtttca	aagaaaaaca	ccacattacc	ccacgggtgg	1140
ggtgttgcgt	gtatgtccc	catctgtat	aaaaaaggcc	aaccaggttc	ttatattcatc	1200
tgtgccaccc	atgtcgatg	aaaattttt	accaaaggat	cactaatttt	ccgaccagaa	1260
cgatgggtgt	aagaaccact	cataaaagaaa	aatttggctt	ggtcatattt	accattcaat	1320
ggtggtccac	gtatctgtct	aggtaacacg	tttgccttcaa	ctgaagctt	atatgtgttt	1380
acccgtttag	ctcaatgtt	tactaaaatc	tccttacaac	caaatagttt	tgaataccct	1440
cctaagaaac	aagtccattt	aaccatgagt	ttgctcgacg	gagttcatgt	caaaaatatac	1500
aacctatcca	tctctttaa					1518

<210> 39
 <211> 1566
 <212> DNA
 <213> Candida maltosa

 <220>
 <223> cytochrome P450 monooxygenase Alk5-A

<400> 39

```

atgattgtatg aaataacttcc taaaattggtt caataactgggt atattgtgct tccaaactttt 60
ttgattataaa aacatgttgt atcatacatt aacacccaaac gtttaatgcg gaaattcaga 120
gctaaaccag tgactaatgt cttgaatgtat gggtttttg gtataccaaa tggtatcaaa 180
gcaataaaaag agaaaaaaca ggggcgtgcc caagaatata acgataaaaa gttcggcgcc 240
ggtccccaaac caaaagtggg gacatattt ttcaagtat ttactaaaga tggtcgt 300
accaaagatc cagaaaaacat taaagcgtatc tttagctactc aatttgaaga ttttcatta 360
ggtaaaaagat tgatgtttt taaaccattt gggggtagc ggatattcac attggacggt 420
gaagggtgga aacatagtgc tgccatgtt agaccacaat ttgctagaga acaagtccgga 480
catgttaaat taatcgagcc acatttccaa tcattgaaga aacatataat taaaataaaa 540
ggtcaatttt tcgatatcca ggaatttattt ttcaagatca cgggtgattc cgcaactgag 600
tttttattttt gtgaatcggt tgagtcattt aaagatgaat ctattggata tgaccaacaa 660
gattttgatt ttgatggaa gaagaatttc gcagaagcgt tcaataaggc acaggagtat 720
ttgggtactc gtgttatattt gcaactgttt tattggtag ttaatgggc tgacttcaag 780
aaatcgttag ctgaagttca taaatttact gactactatg ttcaaaaagc gttggatgt 840
accccggaaag aacttggaaa gcatagtggt tatattttt tttatgtt ggtcaacaa 900
acaagagatc caaaagtttt aagagatcaa tcattgaata ttttattggc tggtagagat 960
accactgctg ggttgttattc cttgcctta tttgaatttgc ttagaaaccc agaagttgg 1020
tccagattga gagaagaaat tgggtataaa tttggatttgc atgaagatgc cacaatcgaa 1080
ggtatttcat ttgaatcggtt gaaacaatgtt gaatatttgc aggcggtagt taatgtt 1140
ttaagaatgtt accatctgt tccaaagaaat ttccgtatttgc ccactaaaca caccacatta 1200
ccaaaggggtg gaggtcctga cggtaaagat ccaatttttca taaaaaggg tgcagttgt 1260
tcatatgtt ttaacagtac tcattttactt ccaatgtact acggtccaga tgctcggtt 1320
tttaaccctg acagatggc caaaccagaa actaagaaat tggatgggc attttgc 1380
ttcaatggtg gtcctaagaat ttgtttgggt caacaatttgc cccttactga agcttcctat 1440
gtattgttta gaatgattca aaatttcaaa gagttggagt tgactccgaa tacagttat 1500
ccaccaagaa gattgacca tttaaccatg agtttatacg atggagctt cattaaagta 1560
aattaa
  
```

<210> 40
 <211> 1533
 <212> DNA
 <213> Candida maltosa

 <220>
 <223> cytochrome P450 monooxygenase Alk6-A

<400> 40

```

atgattgtacg cattatacat cttaatagtt gctttggta tttacaaaac agcacagttc 60
gtgcacagaa agtcgttgc gaagaagcac cactgtcagc cggtaaagca aatcccaatt 120
gtttctatcc tttcaggatt aggtttgtat atgttttca aagacactgc agagatgacc 180
aaaaacgggg gtttgcataa aaaactccaa caaatgttgg aatcactcca aaccaccact 240
tttagatctc gaatgttgc aggatccaa attgtcacca tggaaaccaga aaacgaacgt 300
accatgtgtatc gcagtgccca tatggaaagat tggaccatttgc ggtatagacc atttgcgtt 360
aagccattat taggtgtatgg tattttctct agtgaaggtg aatcatggaa acatagtcg 420
attatgttta gaccgatatt tgccaaaggaa catatcaaacc aataactgc catggaaacca 480
tatatgttgc tgcttatttgc aattatcaag agtagttagtgc caaacgaagg gccgggtt 540
ttgcaaccgt tgtttcatgc attcaacttattt gattatgtca gtgactttt gtttggcgaa 600
agttgtgtatgg tggtaaaga gaattttgc ggttaaatcga catcggtat ggtatgcgca 660
gtgaagagag actttgcctt tggtttaat gacgtccaga attacttgc gaaaagaatg 720
atgcttggtc cattggctt ctttagtttgc tccaaagatttgc acacgacgg gattaagaaa 780
  
```

```

caacatgaat ttgtttcata ctttggtaaa aaagctattt ccatgagtga cgaagagttg 840
aatgatgaat cggaaaaacta tggttttttg tatcaattgg ctaaacaaac caaagatgcc 900
aaagtttgc aagacgagtt attgagtatt ttattggccg gaagaaaacac cactgttagt 960
ttgttatcct ttttattttt tgaatttgagt caccatgaaa atgtttggac aactttgaag 1020
gaagttgttg accaatttcatt ccctgatgtc gagtcaatca catttgaac cattcaaaac 1080
tgtgattatt tgcgttgggt ttttatttggaa agcttgcggg tcaatccttc agttccattc 1140
aacagcagaa ctgccaacaa ggataccatt ttaccaagag gtggaggtga agatttgtag 1200
catccaatct tggtcaagaa gggagatcag gttttttcc cactttacgc ttccaataga 1260
caagaaaaat attttggtcg caaaccggag gaattttatc cgagagatg gagagattta 1320
cctaaaactg gtggtccagc atttatgcca tttagtacgg gtccaaagaat gtgtttgggt 1380
caacaatttg cttaatttga agcttcgtac gtgacaatta gattagttca aacttttagt 1440
aaactcaaaa gtcatagttt ggaatatgca caaaaaaagac tgggttgcgc aactataaga 1500
ttaatcgatg gttgttttgt aagtttcgaa taa 1533

```

```
<210> 41
<211> 1560
<212> DNA
<213> Candida maltosa
```

<220>
<223> cytochrome P450 monooxygenase Alk7

<400> 41
atgattttca cagcattcat acttgactac tggtaacttca ctctgctttt cttaatcgcc 60
gcttacttta tcggaaaaca tgtttacacg aactacttaa tgccggaaaca ccacgcttag 120
ccaatcttgg acgttgtcga cgatgggtct ttcggtttca aattcggctt ccagtcttgc 180
aaagctaaga aaatcgaaa tcagattgtat ttattgttcc tgaaattcaa cgaagcgaaa 240
catccttcaa ttggtaactt cgtgactcgt agttttggaa tgcaactttat tgcaactaaa 300
gatccggaaa atatcaaggc gatgttggct acacaattca atgagtacac attaggtcaa 360
cggttaaatt ttttagctcc attgttggc aaaggatata ttaccttggta tgggaatggta 420
tggaaacata gtcgtgccat gttgagacca caattttcaa gagaccagat tggtcatgtg 480
aagatgcttgc aaccacatt tcaatttgcatt aagaaacata tcattaagaa taaggggact 540
tttttcgata ttccaggaaatt gttttcaga ttactgttgc attctgcaac tgagttttta 600
ttcgggtgaat cggttgcgtc attgaaggat gaatctattt gatgtatca agaagaaatt 660
gattttgtcg gtaggaaaga ttttgcgtaa gcgttcaaca aatcacaagt ctatttgc 720
actaggactt tattacaact gtttatattgg ttagtcaact ccgctgattt caagagatgt 780
aacaaaaatag tccacaagtt tagtgattac tatattaaaa aagcattgac tgctactcca 840
gaagagcttgc aaaaacatag cagttatata ttttatacg aattggcaaa gcaaacaaga 900
gacccaatttgc ttttgagaga tcaatcggttgc aatattttat tagctggaaag agacaccacc 960
gccggtttat tatcggttgc cgtgtttgaa ttaggaagaa acccagaagt ttggcttaaa 1020
ttgagacaag aaatcggtca taaattcgga ttagactctt attctcggtt cgaagatatc 1080
tcatttgaat tggtaaact gtgtgaatac ttgaaagctg tgctcaatga aacattacga 1140
ctttatccatgttgc ttgtcccacg taatgctaga tttggccgcta aaaacactac tttacccat 1200
ggtggggcc ctgatggtat gtcaccaata ttggtaagaa agggacaaac ggtgtatgtat 1260
agtgtttatgc cacttcaaaag ggatggaaag tattacggta aagatgctaa tgaattccgt 1320
ccagaaaatgc ggttgaacc agaagtcaga aaacttggat gggcattttt accgtttaac 1380
ggtggccaa gaatttggttt aggtcaacag tttgccttaa ctgaagcttc gtacgtgttgc 1440
gctcggttgc ttcaatcggtt gtaaacttta gagttgagcc cagaaggcgc gtaccacact 1500
gctaaattaa gtcatttgc tatgtgttta tttgatggta ctccctgttgc ttttgaatag 1560

```
<210> 42
<211> 1560
<212> DNA
<213> Candida maltosa
```

<220>
<223> cytochrome P450 monooxygenase Alk8

<400> 42

atggtttca	cagcattcat	acttgagtac	tggtaacttca	ctctactttc	cttagccgcg	60
ggtcactta	tcggaaaaca	tgtctacacc	aactacttaa	tgcggaagca	ccacgctgaa	120
ccaatcttgg	atgttgcga	tgatggggca	tttggattca	agtttgggtt	ccaggcattg	180
aaagctaaga	aatcggaa	acagattgat	ttattattca	agaaattcaa	cgaagcgaaa	240
catccttcaa	ttggtaacttt	cgtgactcgt	agtttggaa	tgcagtttat	tgcaactaaa	300
gatccggaaa	atatcaaggc	gatgtggct	acacaattta	atgatttcac	attaggcCAA	360
aggttggatt	acttgctcc	attgtgggg	aaaggatAT	ttacgttgg	tggagagggt	420
tggaaacata	gccgtgccat	gttgagacca	cagtttcaa	gagatcaagt	tggcatgtg	480
aagatgctt	aacctcattt	tcaattactt	agaaaacata	tcattaagaa	taaaggaggT	540
tttttcgata	ttcaagaatt	gttttcaga	tttacggttg	attctgctac	ggagtttta	600
ttcggtaat	cggttcgtc	gttgaaggat	gagtctattt	ggtatgatca	agaagagatt	660
gattttgtcg	gtagaaaaga	tttgcagaa	gcattcaaca	aatcccaggt	ttatttgcg	720
actagatott	tattacaact	gttatattgg	ttagttaatt	catctgattt	caagagatgc	780
aataagattt	ttcacaagtt	tagtggattac	tatattaaaa	aagcattgac	tgctactccg	840
gaagagctt	aaaaacatag	cagctatata	tttttatacg	aattggcaaa	acaaacaaga	900
gacccaaatag	tattgagaga	tcaatcattt	aatattttat	tagctggaa	agacaccact	960
gctggtttat	tatcgtttgc	tgtgttggaa	ttaggaagaa	acccagaagt	ttggtctaaa	1020
ttgagagaag	aaattggcga	taaatttggaa	ttagatcctg	attccagaat	tgaagatatt	1080
tcatttgaat	tattgaaaact	gtgtgaatac	ttgaaagctg	tgattaatga	aacattaaga	1140
ctttatccta	gtgttccacg	taatgtaga	tttgcggctg	caaacactac	attaccacac	1200
gggtgtggtc	ctgatggtat	gtcacctatt	ttggtaagaa	agggtcaaac	ggtcatgtat	1260
agtgttacg	cacttcaaag	agatgagaaa	tattatggta	aggatgctaa	tgaattccgt	1320
ccagaaaagat	ggtttgaacc	agaagttcga	aaactcggat	gggcattttt	accattcaat	1380
gggtgtccaa	gaatttggtt	aggtcaacag	tttgccttga	ctgaagctt	atacgtgtt	1440
gttcgtttga	ttcaatcgtt	tgaaactttt	gagttggatc	cagacgctt	atacccacct	1500
gctaaattga	cacatttgac	tatgtgtttt	tttggatggt	cacctgtccg	tattgaatag	1560

<210> 43

<211> 2043

<212> DNA

<213> Candida maltosa

<220>

<223> cytochrome P450 reductase

<400> 43

atggcattag	ataaattttaga	tttatatgtt	attatagtat	tggcagttgc	agtagctgct	60
tatttcgcca	aaaatcaatt	ccttgcatttca	cctcaagata	ctgggtttct	ttctaatgtat	120
accgcgttgt	gttaattccag	agatatcttgc	gaaacattaa	agaagaataa	taaaaataca	180
tttattactat	ttgggtctca	aactgtact	gctgaagatt	atgctaataa	attaagtata	240
gaaatacatt	caagatttgg	ttttaaaaact	atgggtgcag	atttgcgcg	ttacgattgg	300
gacaatttcg	gtgatattcc	aatatgatata	ttgggtttct	ttattgtgc	tacttacgg	360
gaaggggaac	caaccgatata	tgcagacgaa	ttccataactt	ggttaactga	tgaagctgat	420
actttgatgt	ctttaagata	cactgttttgc	gttttaggtt	actctactt	tgagtttac	480
aatgcatttgc	gttagaaaattt	tgacagatgtt	tttggaaagaa	aaggagggtt	aagattcgct	540
gactacgggt	aagggtatgt	tggtaacttgc	actttggat	aagatttctt	gacttggaaag	600
gataacgtgt	ttgatatttttgc	gaagaatgtat	ttgaaatttttgc	aagaaaagaga	attgaaataac	660
gaaccaaaatgt	tcaaaatttgc	tgaacgtat	gatttaacttgc	tcgacgtat	cgaagtttcc	720
ttgggtgttgc	caaaacaagaa	atataatccaa	tctgaagaaa	tttgcatttgc	taaagggttcca	780
tttgcatttgc	ccccatccttca	tttgcatttttgc	atttccaaaa	ctagagaattt	atttgcatttcc	840
aaagaaaagaa	actgtgttca	tgttgcatttttgc	atccaatttgc	gaaatacact	900	
accgggtgttgc	attagctgtt	tttgcatttgc	aactctgtat	aaaatatttgc	caaatttatttgc	960
aatatgttttgc	gttttagacgtt	taaaatttacat	actgttttgc	aatttggaaatgc	tttagatttcc	1020
acttataatgc	tcccatcatttgc	aaacccaaatc	acctatggcg	ccgttgcgttgc	acatcatttgc	1080
gaaatttttgc	gtccagtttgc	tagacaatttgc	tttttggcttgc	tttgcatttttgc	tgctcctgtat	1140
gaagaaaacca	agaagacatttgc	cactagaatttgc	gttataatgtat	aacaagaatttgc	tgctaacaaa	1200
atcactcgat	agaagtttgc	tgttgcgcac	gccttgggttgc	tttgcatttgc	tggtagacca	1260
tggtctgtat	ttcccttttgc	atttatttttgc	gaaaatgttcc	cacacttgc	accacgttat	1320
tactccatttgc	cttcatcttgc	tttgcatttttgc	aaacaaacca	ttaacatcac	tgccgttgc	1380

gaagttgaag aagaagccga tggtagagca gttactggtg tggttaccaa cttgttgaaa 1440
aacattgaaa ttgaacaaaa caaaaccggt gaaaaaccag ttgttcatta cgatttaagt 1500
ggtccaagaa acaagttaa caaattcaaa ttaccagtgc atgtcagaag atccaatttc 1560
aaattaccaa aaaatactac tactccagtg attttgattt gtccaggtac gggtgtggct 1620
ccattgagag gtttggtag agaaagagtc caacaaggta agaatggtgt taatgttgg 1680
aaaaccgtt taccctacgg ttgttagaaac gaacacgatg acttttgta taaaaaaagaa 1740
tggctgaat atgcttcgt attgggtgaa aatttcgaaa tggttactgc ttttcaaga 1800
caagatccaa gtaagaaaagt ttatgttcaa gataaaaattt ctgaaaatag caaacttgc 1860
aatgatttat taaacgaagg tgctattatt tatgtttgtg gtgatgccag tagaatggct 1920
agagatgttc aaagcaccat tgcaaagatt gttgctaaac acagagaaat tcaagaagat 1980
aaagctgttgc atttggtcaa atcttgaaa gtgcaaaaca gataccaaga agatgttgg 2040
tag 2043